

## CLAIMS

What is claimed is:

- 1 1. A broad-angle multilayer (ML) mirror comprising a multiple layer structure to provide uniform reflectivity over a wide range of angles with small phase shifts.
- 1 2. The ML mirror of claim 1 wherein the ML mirror provides an acceptance angle in excess of 20° without a significant loss of reflectivity.
- 1 3. The ML mirror of claim 2 wherein the loss of reflectivity is approximately 17%.
- 1 4. The ML mirror of claim 1 wherein the ML mirror increases the relative phase shift.
- 1 5. The ML mirror of claim 1 wherein the ML mirror comprises a 13.5nm central wavelength.
- 1 6. The ML mirror of claim 1 wherein the structure comprises:
  - 2 a substrate layer; and
  - 3 a plurality of bi-layers to provide a 13.5nm central wavelength.
- 1 7. The ML mirror of claim 6 wherein the plurality of bi-layers have a variable thickness.

1    8.     The ML mirror of claim 6 wherein the plurality of bi-layers include thirty-  
2     six bi-layers.

1    9.     The ML mirror of claim 6 wherein the bi-layers are comprised of Mo/Si  
2     bi-layers.

1    10.    The ML mirror of claim 6 wherein the bi-layers are comprised of Mo/Be  
2     bi-layers.

1    11.    An optical system having an extreme ultra-violet (EUV) radiation source,  
2     the system comprising:

3         a mask;

4         a wafer; and

5         a plurality of reflecting surfaces for imaging the mask on the wafer,  
6     wherein one or more of the plurality of reflecting surfaces includes a broad-angle  
7     multilayer (ML) mirror having a multiple layer structure to provide uniform  
8     reflectivity over a wide range of angles with small phase shifts.

1    12.    The system of claim 11 wherein the plurality of reflecting surfaces  
2     comprises six mirrors.

1    13.    The system of claim 11 wherein the ML mirror provides an acceptance  
2     angle in excess of 20° without a significant loss of reflectivity.

1    14.    The system of claim 13 wherein the ML mirror has a loss of reflectivity of  
2    approximately 17%.

1    15.    The system of claim 11 wherein the ML mirror increases the relative phase  
2    shift.

1    16.    The system of claim 11 wherein the ML mirror comprises a 13.5nm central  
2    wavelength.

1    17.    The system of claim 11 wherein the mirror comprises:  
2              a substrate layer; and  
3              a plurality of bi-layers to provide a 13.5nm central wavelength.

1    18.    The system of claim 17 wherein the plurality of bi-layers have a variable  
2    thickness.

1    19.    The system of claim 18 wherein the plurality of bi-layers include thirty-six  
2    bi-layers.

1    20.    An optical system having an extreme ultra-violet (EUV) radiation source,  
2    the system comprising:  
3              a mask;  
4              a wafer; and  
5              a plurality of reflecting surfaces for imaging the mask on the wafer,

6 including:

7           a first mirror;

8           a second mirror,

9           a third mirror having a multiple layer structure to provide uniform

10          reflectivity over a wide range of angles with small phase shifts;

11          a fourth mirror;

12          a fifth mirror; and

13          a sixth mirror.

1   21.   The system mirror of claim 20 wherein the third mirror provides an

2   acceptance angle in excess of 20° without a significant loss of reflectivity.

1   22.   The system of claim 21 wherein the third mirror has a loss of reflectivity of

2   approximately 17%.

1   23.   The system mirror of claim 22 wherein the third mirror comprises a

2   13.5nm central wavelength.

1   24.   The system of claim 20 wherein the third mirror comprises:

2   a substrate layer; and

3   a plurality of bi-layers to provide a 13.5nm central wavelength.

1   25.   The system of claim 24 wherein the plurality of bi-layers have a variable

2 thickness.

1 26. The system of claim 24 wherein the plurality of bi-layers include thirty-six  
2 bi-layers.